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**Title: JP10139918A2: POROUS MEMBRANE**
**Derwent Title:** Porous membrane used for battery separators - prepd. by covering surface of porous membrane of thermoplastic resin with lubricant.  
[\[Derwent Record\]](#)
**Country:** JP Japan

**Kind:** A

**Inventor:** NISHIYAMA SOJI;  
YAMAMURA TAKASHI;  
WANO TAKASHI;  
MATSUSHITA KIICHIRO;  
WATANABE YOSHINOBU;

**Assignee:** NITTO DENKO CORP  
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**Published / Filed:** 1998-05-26 / 1996-11-06

**Application Number:** JP1996000293612

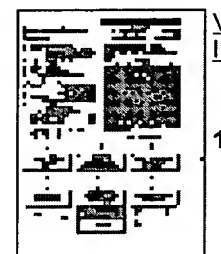
**IPC Code:** C08J 9/36; H01M 2/16; C08L 23/02;

**Priority Number:** 1996-11-06 JP1996000293612

**Abstract:** PROBLEM TO BE SOLVED: To obtain a porous membrane improved in strengths, SD(shut-down) function and the easiness of core pull-out by surface-coating a porous membrane made from a thermoplastic resin with a lubricant.

SOLUTION: A thermoplastic resin is mixed with a reagent to be extracted later, and the mixture is molded into a sheet. This sheet is oriented at a temperature as low as -50 to 100°C, then oriented at a temperature as high as 101 to 160°C, and extracted with e.g. a solvent to remove the reagent and to thereby obtain the porous membrane having a thickness of 10-100µm, a porosity of 20-80% and a mean pore diameter of 0.01-1µm. This membrane is surface-treated with at least one lubricant selected among paraffin waxes, microcrystalline waxes, low-molecular-weight polyethylenes, low-molecular-weight polypropylenes, fatty acid esters and fatty acid amides in a coating weight W of 0.1-5.0. W is defined by the equation:  $W = [(W1 - W0) / W1] \times 100$  (wherein W1 is the weight of the porous film after being coated, and W0 is the weight of the porous film before being coated). The coated membrane can show improved easiness of core pull-out as well as strengths (e.g. penetration strength) sufficient for battery separators.



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**Family:** None


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References:

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| PDF   | Patent                    | Pub.Date   | Inventor           | Assignee     | Title  |
|---|---------------------------|------------|--------------------|--------------|--|
|  | <a href="#">US6692867</a> | 2004-02-17 | Nark; Robert A.    | Celgard Inc. | <a href="#">Battery separator-pin removal</a>  |
|  | <a href="#">US6586912</a> | 2003-07-01 | Tsukamoto; Hisashi | Quallion LLC | <a href="#">Method and apparatus for amplitude limiting battery temperature spikes</a> |

Other Abstract  
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CHEMABS 129(05)055224P CAN129(05)055224P DERABS C98-357598 DERC98-357598



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**PATENT ABSTRACTS OF JAPAN**(21) Application number: **08293612**(51) Intl. Cl.: **C08J 9/36 H01M 2/16**(22) Application date: **06.11.96**

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| (43) Date of application publication: <b>26.05.98</b> | (72) Inventor: <b>NISHIYAMA SOJI<br/>YAMAMURA TAKASHI<br/>WANO TAKASHI<br/>MATSUSHITA KIICHIRO<br/>WATANABE YOSHINOBU</b> |
| (84) Designated contracting states:                   | (74) Representative:  |

**(54) POROUS MEMBRANE**

(57) Abstract:

**PROBLEM TO BE SOLVED:** To obtain a porous membrane improved in strengths, SD(shut-down) function and the easiness of core pull-out by surface-coating a porous membrane made from a thermoplastic resin with a lubricant.

**SOLUTION:** A thermoplastic resin is mixed with a reagent to be extracted later, and the mixture is molded into a sheet. This sheet is oriented at a temperature as low as -50 to 100°C, then oriented at a temperature as high as 101 to 160°C, and extracted with e.g. a solvent to remove the reagent and to thereby obtain the porous membrane having a thickness of 10-100µm, a porosity of 20-80% and a mean pore diameter of 0.01-1µm. This membrane is surface-treated with at least one lubricant selected among paraffin waxes, microcrystalline waxes, low-molecular-weight

polyethylenes, low-molecular-weight polypropylenes, fatty acid esters and fatty acid amides in a coating weight W of 0.1-5.0. W is defined by the equation:  $W = [(W1 - W0) / W1] \times 100$  (wherein W1 is the weight of the porous film after being coated, and W0 is the weight of the porous film before being coated). The coated membrane can show improved easiness of core pull-out as well as strengths (e.g. penetration strength) sufficient for battery separators.

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